



# Institute Seminar

**14 January 2016**

**4:00 p.m.**

**Fermion**

**Speaker:**

**Dr. John W. Freeland**

*X-ray Science Division, Argonne National Laboratory, USA*

**Title:**

**Exploring Non-Equilibrium Phases of Complex Oxide Heterostructures**

**Abstract:**

Functional oxides based on the transition metal series display a wide spectrum of remarkable electronic properties including magnetism, superconductivity and metal-insulator transitions, which offer potential important properties for practical applications including colossal responses to external fields, switchable conductivity, and efficient energy conversion. However, under these conditions for application, these systems tend to be driven far away from the equilibrium ground-state. In order to harness these materials for the future, one of the grand challenges is to understand how to map the non-equilibrium phase space both to seek conditions where new states emerge but also as a basis for the design of materials that will help meet the energy needs of the future. In this talk, I will touch on recent work ranging from optical excitation[1,2] to catalysis[3,4] to watching how materials grow[5] as an introduction to how some of the forefront X-ray tools are helping us to scratch the surface of this problem.

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- [1] H. Wen et al. Phys. Rev. Lett. **110**, 37601 (2013).
- [2] H. Wen et al. Physical Review B **88**, 165424 (2013).
- [3] H. Jeon et al. Nature Materials **12**, 1056 (2013).
- [4] S.-H Chang et al. Nature Communications **5**, 4191 (2014).
- [5] J.H. Lee et al. Nature Materials **13**, 879 (2014)

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